

# Colegio ALTAIR



Subject: 9th BIOLOGY

Teacher's notes

Class: Photosynthesis

Objectives

Date:

Vocabulary

September 30th

Link and Learn

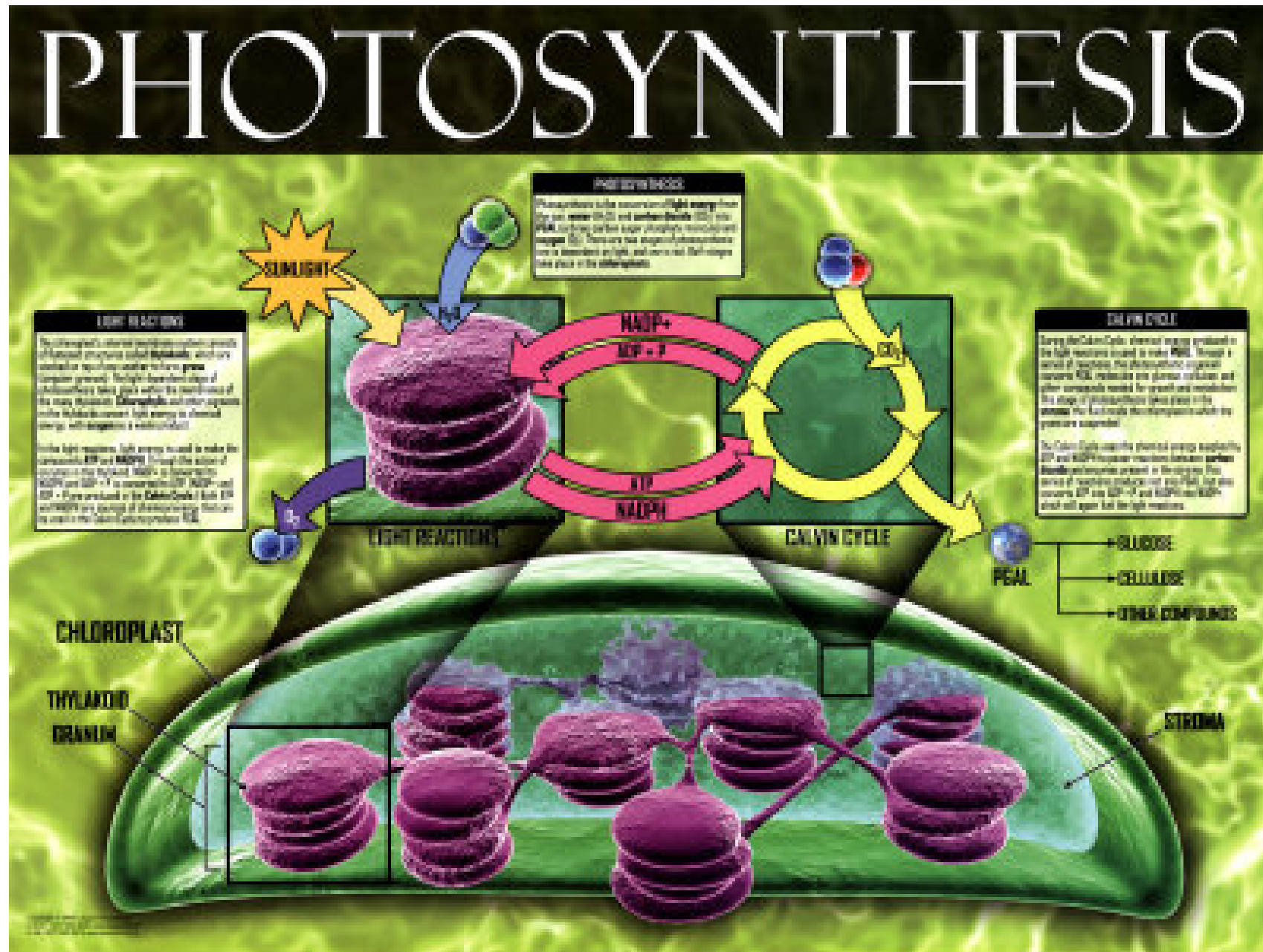
# 2011

Prepared by

**ANIMATION**

***Leaf section***

**<http://goo.gl/HZo2K>**



# PHOTOSYNTHESIS

- Plants need and use the same types of foods (carbohydrates, proteins and fats) as animals but, plants are able to make the food they need from chemicals in the air and the soil.
- Plants do this through *Photosynthesis*, by which they take *carbon dioxide* from the air and *water* from the soil, and use *energy* from the *sunlight* to convert them into food, in the form of *Glucose*.
- *Oxygen* is also produced in photosynthesis, and although some is used inside the plant for respiration, most is not needed and is given out as a *Waste product*.
- The sunlight is absorbed by the molecule *Chlorophyll* (green pigment).

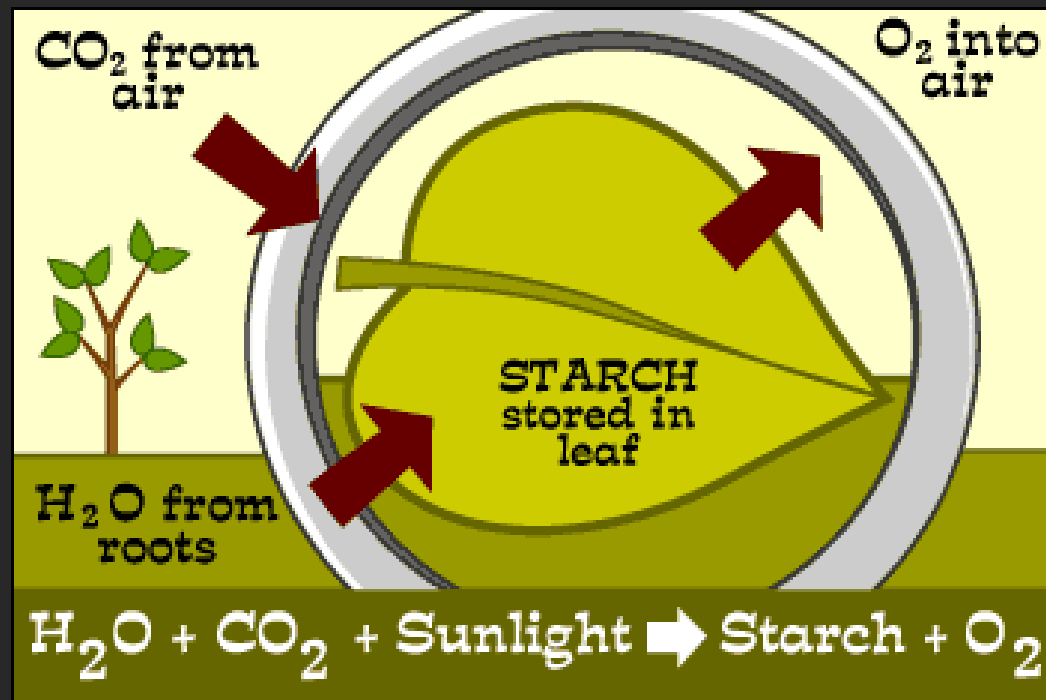
**ANIMATION**

***Overview of Photosynthesis***

**<http://goo.gl/nFqMP>**

# Reaction Formula

Carbon dioxide + Water  $\longrightarrow$  Glucose + Oxygen



**ANIMATION**

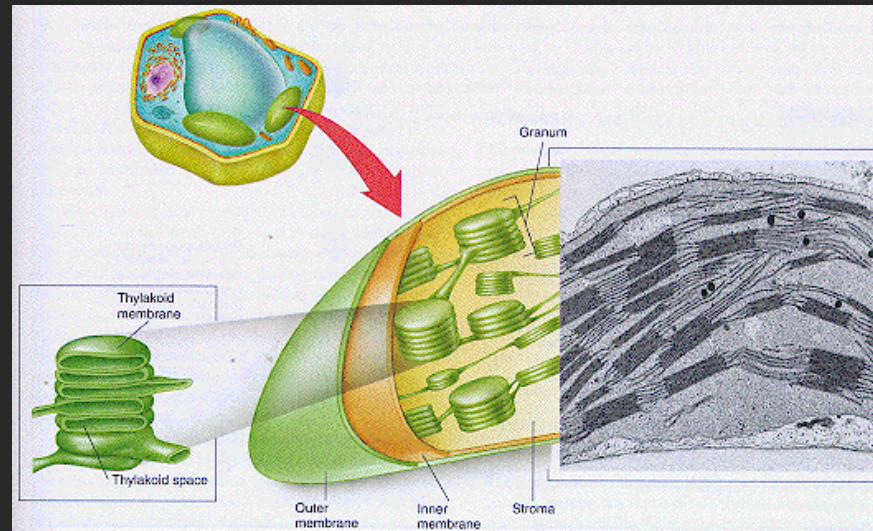
*Illuminating*

*Photosynthesis*

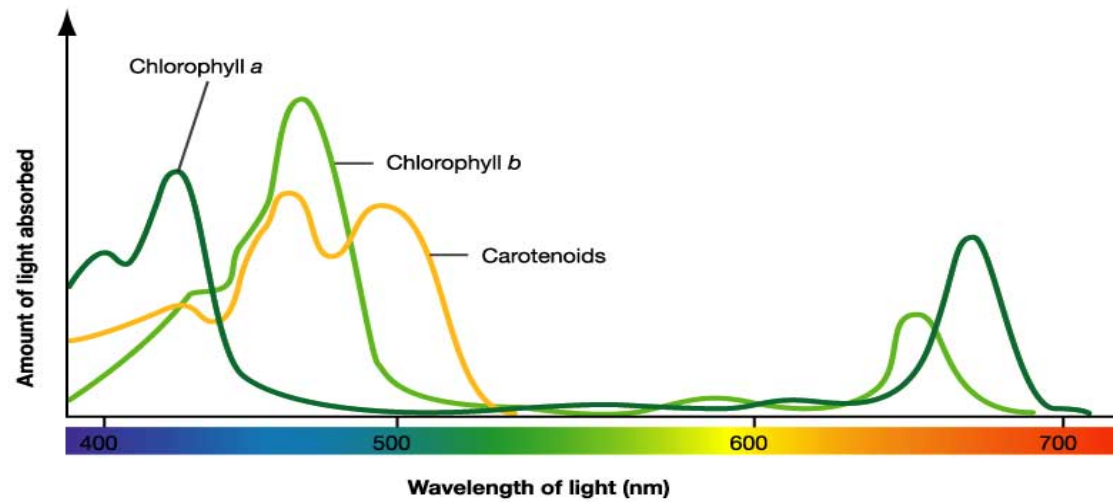
<http://goo.gl/ITp8>

## Stage 1: Light-dependent Reaction

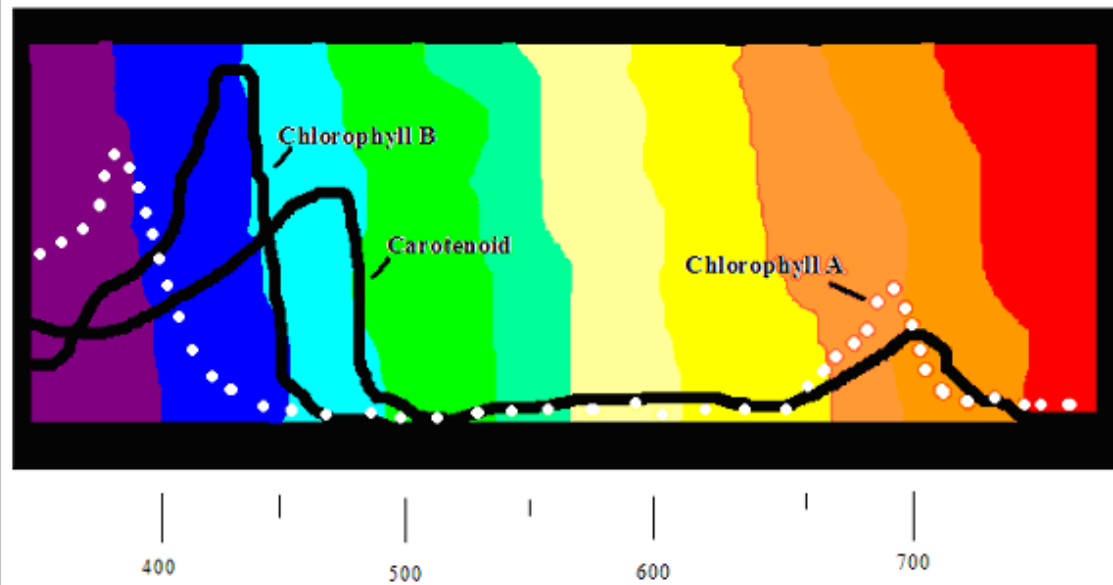
- A Chloroplast has an outer membrane and an inner membrane.
- Molecules diffuse easily through the outer membrane. The inner membrane is much more selective. Both membranes allow light to pass through.
- The space inside the inner membrane is the stroma, within the stroma the *thylakoid membrane* is folded and flat, in disc-like *thylakoids*.
- These sacs, which contain molecules that absorb light energy for photosynthesis, are arranged in stacks.
- The first stage of photosynthesis begins when light waves hit these stacks.
- There are two substages: Photosystem I and Photosystem II.







Absorption Spectra of Photosynthesis Pigments



# ANIMATION

*Photosynthesis: Light reactions*

<http://goo.gl/5WSal>

# ANIMATION

## *Photosynthetic Electron Transport Chain and ATP Synthesis*

<http://goo.gl/RRg9G>

## Stage 2: Light-independent The Dark Reaction

- In the final stage of photosynthesis, ATP and NADPH are used to produce energy-storing sugar molecules from the carbon in carbon dioxide.
- This process is called *carbon fixation*, the reactions that lead to that are light-independent reactions, also referred to as *dark reactions*.
- There are several ways to in which carbon is fixed, the most common is the Calvin Cycle.

# Calvin Cycle

## Step 1: CARBON FIXATION

An enzyme adds a molecule of  $\text{CO}_2$ , to a five-carbon compound.

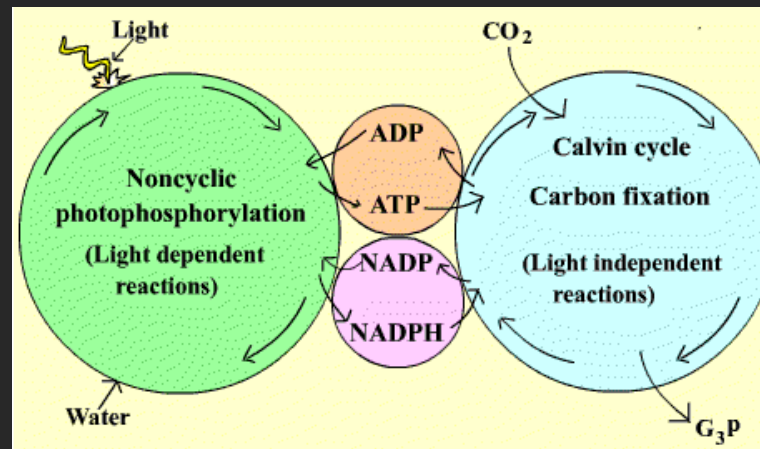
## Step 2: TRANSFERRING ENERGY

Each six-carbon compound splits into two three-carbon compounds.

Phosphate groups from ATP and electrons from NADPH are added to the three-carbon compounds to form higher energy three-carbon sugars.

## Step 3: MAKING SUGAR

One of the resulting three-carbon sugars leaves the cycle and is used to make organic compounds including: glucose, sucrose, and starch; in which energy is stored for later use by the organism.



**ANIMATION**

***How the Calvin Cycle works***

**<http://goo.gl/JER1J>**

# Factors affecting Photosynthesis

**LIGHT INTENSITY:** Plants are adapted to different levels of light. In general, photosynthesis increases as light intensity increases until all of the pigments in a chloroplast are being used.

**CARBON DIOXIDE:** The concentration of CO<sub>2</sub> affects the rate of photosynthesis in a way similar to light. Once a certain concentration of CO<sub>2</sub> is present, photosynthesis cannot proceed any faster.

**TEMPERATURE:** Photosynthesis is most efficient in a certain range of temperatures. Like all metabolic processes, photosynthesis involves many enzyme-assisted chemical reactions. Unfavorable temperatures may inactivate certain enzymes so that reactions cannot take place.

**ANIMATION**

***Overivew of Photosynthesis***

**<http://goo.gl/WPnMY>**



# ANIMATION

## *Cyclic and Non-cyclic Phosphorilation*

<http://bit.ly/cyytVg>

## Teacher's Notes

This class has been designed to cover the topics of *Photosynthesis* from Monday, September 26th till Friday, September 30th.

For further knowledge about this topic:

1. Conduct a thorough search under the topic: *Photosynthesis* on the Web, books and magazines.
2. If findings are not specific, ask your teacher for suggestions.

# BACK

# Objectives

- Learn and understand the intricate process of Photosynthesis.
- Identify and describe the stages in the Photosynthesis process.
- Describe the formula to explain the Photosynthesis process.

**Note:** *All, or most, of the objectives will be covered during class time, however the student must be responsible for those objectives not covered or concluded.*

# BACK

# Vocabulary

- Leaf:
- Sunlight:
- Photosynthesis:
- Phloem:

**Note:** *Most of the vocabulary words will be covered during class time, however the student must be responsible for those words not covered or concluded.*

# BACK

## Link and Learn

You can visit the following websites to improve your understanding on the present topic:

- <http://science-altair.wikispaces.com>
- <http://learningandscience.blogspot.com>

# BACK

# Prepared by



**Gerardo LAZARO**

**Science and Biology Teacher**

**Email: [glazaro@altair.edu.pe](mailto:glazaro@altair.edu.pe)**

**Wiki: <http://science-altair.wikispaces.com>**

**Blog: <http://learningandscience.blogspot.com>**

**Twitter: <http://twitter.com/glazaro>**

# BACK